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ABSTRACT

This compilation presents material relating to the Content Reading in Secondary Schools (CRISS) program, developed by Kalispell, Montana schools. The program focuses on science, math, English, and social studies and is designed to help all students read, write, and learn more effectively. The compilation contains general information about the CRISS program, an "adopter's guide" (a manual for school administrators), and then presents the adoption agreement, agendas for a 2-day and a 3-day reading and writing across the curriculum inservice program, samples from the training manual and student examples, evidence of the effectiveness of the program, and a reprint of an article about a CRISS program implemented in Maine. (RS)

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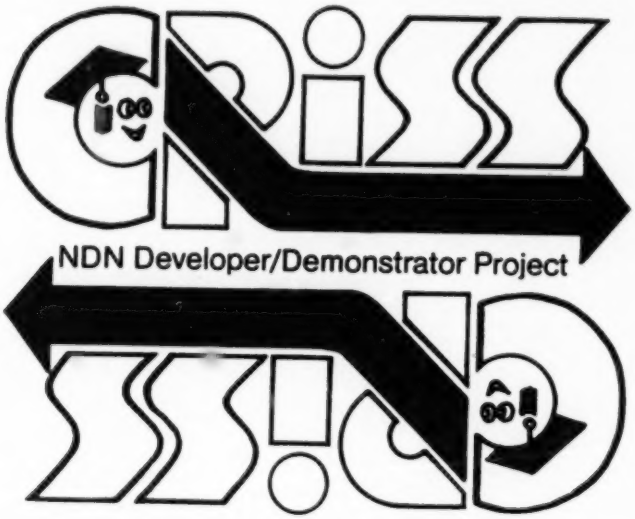

Content Reading in Secondary Schools

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Content Reading in Secondary Schools

NDN Developer/Demonstrator Project

The Content Reading in Secondary Schools (CRISS) Project fills a striking need in our educational system. It is the goal of the CRISS Project to provide students with skills that will help them better organize, understand, and retain course information. In short, students receiving the CRISS method of instruction will "learn how to learn."

The CRISS program was developed in the Kalispell, Montana Public Schools beginning in 1979. The program was written by teachers under the direction of Dr. Carol Santa, District Reading Coordinator. Since its origin the program has been highly successful as evidenced by its being selected first as a state validated demonstration site, and then as a nationally validated project, for grades 10 through 12, in March, 1985.

THEORETICAL BASE: In order to enhance student learning, CRISS employs three concepts, drawn from cognitive psychology. First, students must be able to integrate new information with prior knowledge. Second, students must become actively involved in their own learning. Third, students must be able to monitor their own learning in order to identify which strategies are the most effective for a given set of learning materials. The project holds that these skills can and should be taught by secondary content teachers and that they are key to maximizing the aquisition of information.

FRAMEWORK FOR EFFECTIVE TEACHING: To present CRISS strategies in the classroom, the teacher must use an instructional style that is direct and includes four sequential components:

1. Introduction
2. Modeling
3. Guided Practice
4. Independent Application

The following example may assist in understanding how these components are used in the classroom setting. In teaching students how to understand main ideas through text organization, the instructor may use the following steps:

1. Introduction. The instructor first develops rules or steps for analyzing the organization of a text. The teacher and students discuss the various ways in which main ideas can be presented and identify specific reading procedures for discerning the author's style. For example, a text may be written with main ideas noted in the introductory paragraph, in topical headings, or

within the opening sentences of each paragraph. Helping students understand the organizational style is a prerequisite to comprehension.

2. Modeling. Direct instruction continues by teacher modeling. The teacher "talks through" or verbally models for the students his/her own reading of a section of the students' text. By doing this, students hear and observe how their teacher employs text organization skills in order to comprehend meaning. With such modeling the students learn the why, when, where, and how of each new strategy.

3. Guided Practice. Next, students attempt to use the modeled strategies on their own. Class time is allowed for discussing how text organization helped (or hindered) student comprehension. The importance of re-reading in cases where text organization is not immediately obvious is stressed. Throughout, students discuss concepts presented in the text and identify sample examination questions which demand critical and evaluative thinking.

4. Independent Application. After sufficient guided practice, the students independently apply what they have learned about text structure.

The sequence of direct instruction, teacher modeling, guided practice, and independent application is followed in all aspects of the CRISS program.

INSTRUCTIONAL STRATEGIES: The instructional content of the CRISS Project includes the following:

1. Text Assessment. In this component, content teachers learn how to analyze their texts. This includes an evaluation covering the areas of organization and vocabulary.

2. Student Assessment. Participants learn methods for developing tests which will evaluate how effectively students are reading and learning from their textbooks. Successful models and a student assessment checklist are provided in this section.

3. Teaching Text Organization. Once teachers know and understand the organization of their text, they must teach their students how the text is organized. The CRISS manual presents several strategies and teacher-made forms which will aid in this presentation.

4. Main Idea Development. Participants learn how the organization of their text influences the content and how to help students familiarize themselves with the

author's style of main idea development. They also learn active procedures (summarizing, underlining, and notetaking) for extracting main ideas from the text, and strategies for teaching students to self-monitor their progress in understanding these ideas.

5. Learning Guides and Writing Activities. Teachers are presented numerous learning guide formats. These are designed to help students actively organize written or verbal information for understanding and retention. They also provide a framework for studying and monitoring comprehension. The writing activities are used to reinforce and enhance learning. Writing guides and formats help students organize and present material in a clear and concise manner. Teachers are presented with a variety of ways to assign written activities.

6. Vocabulary. Participants learn procedures for helping students develop vocabulary skills. Specific strategies such as the use of context, structural analysis, and categorization are represented.

7. Directed Reading Activity. The Directed Reading Activity (DRA) incorporates everything presented in the program into an overall approach to teaching reading in the content areas. The DRA framework helps teachers develop a set of activities for students to use before, during, and after reading to generate comprehension and retention.

MATERIALS:

All instructional materials are provided by the project. These materials supplement, but do not replace the content text. The training manual contains specific classroom-tested examples in the areas of science, English, mathematics, and social studiies for each topic covered. These topics, as described earlier, are: Text assessment, Student Assessment, Teaching Text Organization, Main Idea Development, Learning Strategies, Vocabulary, and Directed Reading Activity. In addition, an Adopter's Guide, for school administrators, outlines CRISS implementation and evaluation procedures and includes a plan for incorporating the project throughout a district's curriculum. No materials, other than regular course texts, are required of workshop participants.

STAFF DEVELOPMENT:

CRISS participants (we suggest two from each content area and one administrator from each school) are required to attend a two or three day inservice. This inservice will include an introduction to the theoretical framework of the project along with instruction and work sessions for each

of the seven components. In this way, teachers leave the workshop with the procedures and materials for immediate program implementation.

A local facilitator will be selected from each district or school to oversee the project and be a liaison between teachers and the CRISS Project staff. The facilitator will also be in charge of staff and student evaluation and assessing the follow up needs of the district.

EVALUATION:

For a school district to know that a project is successful, it is necessary to evaluate continually both the participating teachers and their students. The project will provide developed evaluation materials. These include an implementation checklist for teachers and pre and post tests for students. The statistical results of the students' tests will be provided at no cost to the district.

COST OF ADOPTION:

The project charges a $40.00 per participant fee (for more than 15 participants the fee is negotiable). This covers the cost of the 200 page training manual, the Adopter's Guide, workshop materials, and evaluation. The costs of travel, lodging, and trainer expenses will be negotiated between the adopting district(s), the State Facilitator, and the CRISS Project staff.

CRISS PROJECT STAFF:

Currently the CRISS staff consists of Dr. Carol Santa, Project Director, and Ms. Lynn Havens, Project Trainer. Several content teachers in Kalispell's School District No. 5 are also available as certified trainers for CRISS. If we can give you further assistance, please write or call:

Dr. Carol Santa / Ms. Lynn Havens
CRISS Project
233 First Avenue East
Kalispell, Montana 59901

(406)755-5015

Content Reading in Secondary Schools

ADOPTER'S GUIDE: A Manual for School Administrators

The Content Reading In Secondary Schools Project (CRISS) is designed to help all students read, write, and learn more effectively. Our project is based on the premise that teaching reading is everyone's responsibility and that such teaching can be done very effectively within the content areas. We are firmly committed to the notion that all secondary students from basic to advanced students must be taught how to read and learn course information. These are skills which must be taught, and the content areas, such as, science, math, English, and social studies, provide an excellent medium for such instruction.

Our project, developed entirely by secondary content teachers, focuses on four areas: science, math, English, and social studies, however, it may be successfully used in any course using written materials. Teachers in each of these content areas have developed instructional strategies and materials which they have evaluated in their classrooms. Sample materials from each of these areas are included in the training manual.

Because the project demonstrated persuasive evidence of effectiveness, we were validated in May, 1981, as a state domonstration site, and in March, 1985, we were approved by the Joint Dissemination and Review Panel (JDRP) and funded by the National Diffusion Network (NDN). Although the project was only validated for grades 10-12, it has been successfully used in grades 4-12. Project students compared to control students demonstrated superior performance in their coursework after applying content reading strategies. Significant outcomes were observed in all content areas. In addition the project appears to have a positive effect upon students' and teachers' attitudes toward reading within the content areas.

The CRISS project has been developed to fit into the existing curriculum. It is not necessary to change either the content or the materials used in any teaching situation, rather the project advocates a change in teaching style.

TRAINING

The CRISS staff provides either a two or three day inservice training at the adoption site. We recommend that at least one or two teachers from each content area attend and that one administrator be present. The topics covered during the two and three day training workshops are approximately the same. The advantage of the three day workshop is that the teachers will have more time to develop materials which can be directly implemented into their classrooms.

It is important for teachers to bring copies of the texts they are currently using so they may use worktime to develop appropriate curriculum materials.

TRAINING MANUAL

Those teachers who participate in the training will be provided with the CRISS Training Manual. The manual is divided into chapters which cover the main components of the project:

1. Theoretical background - This section discusses the teaching styles and strategies that are implemented throughout the manual.

2. Textbook analysis - In this chapter are checklists with which to evaluate existing or new texts as to their organization and how easily they may be read and understood by students.

3. Student Evaluation - This chapter shows several methods for evaluating the reading abilities and study skills of students.

4. Teaching text organization - Before students can learn effectively from a text they need to know how it is organized, this section shows several strategies for presenting text organization.

5. Main ideas - This chapter is designed to give the teacher lots of ways of helping students discover the main ideas of a reading selection. Example activities are explained and illustrated.

6. Learning and writing strategies - Once students are able to pull out the main ideas of a selection they need to organize and use them. This chapter shows many forms of note-taking (learning guides) and provides teachers with imaginative writing ideas which can easily be applied to all content areas.

7. Vocabulary - The vocabulary chapter is divided into three sections: contextual clues, categorization & structured overviews, and structural analysis. Each provides activities the teacher may use in teaching vocabulary in the content areas.

8. Directed Reading Activity (DRA) - This final chapter helps the teacher develop a lesson plan for a given unit which incorporates the theory, strategies and activities presented throughout the manual.

LOCAL FACILITATOR

It is our hope that the CRISS project will eventually be used throughout the district by all teachers, not just those trained by our project staff. As part of the adoption requirements, you are to appoint one teacher or administrator, who has attended the training, as a Local Facilitator. The facilitator should be someone who is respected and has credibility with the teachers. It will be the job of this facilitator to meet individually with the teachers who have been through the in-service training on a regular basis. We also suggest short group meetings after school every other week. These meetings should be sharing sessions. We have found distributing a monthly or bi-monthly newsletter of ideas to be very helpful.

At a time decided on by the facilitator and teachers, there should be a half-day (release time) sharing session. Again, a newsletter of project activities should emerge from this session.

The Local Facilitator needs to begin identifying teachers who have become particularly skilled in project implementation. These teachers should be encouraged to become on-site facilitators trainers responsible for doing staff training with other teachers in the district not originally part of the adoption.

About two months after adoption, the Local Facilitator will have each participating teacher complete an implementation checklist which covers the same areas as the "Teacher Adoption Agreement" signed by the teachers at the end of the adoption workshop. The implementation checklists are provided by the project. One copy will be used by the project staff for the follow-up sessions.

The Local Facilitator should also be a liason between the trained teachers and the project staff. We should be notified at once if there are any questions or problems. Together the facilitator and staff will determine the scope and method of follow-up.

You will find a checklist for the Local Facilitator on pages 5 and 6.

COST TO ADOPTING DISTRICT

1. Release time for teachers participating in the two or three day inservice training.

2. 40.00 per participant fee, which covers the cost of the training manual, this adopter's guide, workshop materials, evaluation and follow-up.

3. Travel, meals, and lodging expenses for the project trainer. These are negotiable and may be shared with the state facilitator for National Diffusion Network (NDN) projects.

4. Time for teachers to share knowledge and to adopt curriculum materials. Adopting district can choose to use PIR time, release time, or after school sharing sessions.

IMPLEMENTATION CHECKLIST FOR LOCAL FACILITATOR

1. A need has been established in the district for adopting the CRISS project (test scores, teacher concerns) date_____

2. A Local Facilitator has been identified in the district (curriculum director, principal) who is responsible for directing the project. date_____

3. The adoption of the CRISS project was discussed with department chairmen and key teaching staff and their support was demonstrated. date_____

4. School board members were informed and are supportive of the adoption of CRISS date_____

5. Teachers were oriented and allowed to volunteer for the CRISS inservice. date_____

6. Teachers and key administrators along with the Local Facilitator from the district participated in the CRISS inservice. date_____

7. The Local Facilitator has arranged to visit classrooms of project teachers on at least a biweekly basis to help with implementation. date_____

8. The Local Facilitator has arranged sharing sessions so that project teachers have an opportunity to share ideas with one another. date_____

9. The Local Facilitator has helped the teachers monitor the implementation of CRISS in their classrooms (Teacher Implementation Checklists, student reactions) date_____

10. The Local Facilitator has encouraged the project teachers to keep a record of student performance so that they can evaluate the effectiveness of the CRISS project. date_____

11. After six to eight months, the Local Facilitator and teachers, using the Teacher Implementation Checklist, will reaffirm their committment to the project. date_____

12. After six to eight months of implementation, the Local Facilitator and the teachers will plan CRISS inservice for other teachers in the district. date_____

13. The Local Facilitator and the teachers refine the curriculum units at least annually. date_____

14. The project teachers with the help of the Local Facilitator will conduct a CRISS inservice for the other teachers in the district. date_____

15. The Local Facilitator will continue to monitor how teachers have implemented the CRISS project within their respective classes. date_____

16. The Local Facilitator will continue to arrange time for teachers to share ideas with regard to the CRISS project. date_____

CONTENT READING IN SECONDARY SCHOOLS

ADOPTION AGREEMENT

District Name _____ Date _____

Contact person _____

Address _____

_____

Phone __(__)_____

Proposed training dates _____

Local Facilitator _____ Phone _____

State Facilitator _____ Phone _____

Classification of adopting district:

__Urban (large city)
__Other urban
__Suburban
__Rural
__Public
__Private

Congressional District _____

Number of high schools _____

Grade levels to be served _____

Estimated number of students to be served at each grade level:

_____ Grade 10 _____ Grade 12 _____ Elementary

_____ Grade 11 _____ Grades 7 - 9

The CRISS Project will:

1. Provide two/three days, or the equivalent, of training.

2. Train a local facilitator to provide immediate and on-going assistance to classroom teachers trained to use CRISS.

3. Provide project-developed materials to adopters.

4. Provide technical assistance and follow-up consultation for the staff of the adopting district by phone, written contract, or on-site visitation as needed or requested by the adopting district. Fees for follow-up visits will be negotiated with the adopting district.

5. Provide guidance in evaluating CRISS's effectiveness.

The Adopting District will:

1. Provide release time for teachers and supervisors to attend the training session. An administrator from each participating school must attend this session.

2. Provide a $40.00 per participant fee which covers costs of CRISS training manual, adopter's guide, workshop materials, and evaluation materials or help.

3. Identify a Local Facilitator to support adopting teachers and act as a liason to CRISS staff and the State Facilitator. Local Facilitator duties will include periodic classroom coaching of CRISS teachers, convening regular support meetings for CRISS teachers, and maintaining regular communication with the CRISS staff.

4. Implement the essential elements of CRISS as follows:

   a. Use the six components of the CRISS Project: Evaluating text, teaching text organization, understanding main ideas, developing learning strategies, teaching vocabulary, and implementing the Directed Reading Activity as part of content instruction.

   b. Follow the CRISS instructional model which includes four steps: Introduction, modeling, guided practice, and independent application.

   c. Use CRISS regularly as part of content instruction.

5. Collect teacher and student impact data with evaluation materials provided by or developed with the help of the CRISS staff.

The State Facilitator will:

1. Assist in logistical and budgetary preparations.

2. Assist in monitoring program implementation.

3. Maintain contact with the adopting site and CRISS staff.

_____ _____

CRISS Project Director Administrator, Adopting District

_____

State Facilitator

Return to: CRISS Project
School District No. 5
233 1st Avenue East
Kalispell, MT 59901

CONTENT READING IN SECONDARY SCHOOLS
READING AND WRITING ACROSS THE CURRICULUM

AGENDA

Day 1:

1. Theorectical Foundation for Learning Across the Curriculum
   a. background knowledge (pp. 2-3)
   b. active vs. passive learning (p. 3)
   c. direct instruction (pp. 4-6)
   d. metacognition (p. 3)

2. Text Assessment: Considerate and Inconsiderate Text
   a. overall structure of text (p. 12)
   b. chapter structure (pp. 12-13)
   c. paragraph structure (p. 13)
   d. vocabulary development (pp. 14-15)
   e. contextual analysis (p. 15: clues p. 23)

3. Student Assessment (pp. 49-74)

4. Teaching Text Organization
   a. teacher modeling and think-alouds (pp. 75-81)
   b. text assessment checklist for students (pp. 82-89)

5. Main Ideas
   a. power thinking
   b. organization of main ideas (mystery pot) (p. 93)
   c. selection underlining (pp. 93-94)
   d. Notetaking from memory
   e. summarizing - paragraph summary (pp. 94-96)
      and one-sentence summary (pp. 97-98)
   f. peer editing
   g. conceptual mapping (p. 102)

Day 2:

5. Main Ideas, cont.
   h. Q.A.R. - question-answer relationships (pp.99-101)

6. Learning and Writing Stratgies
   a. generating students' background knowledge (pp. 90-91)
   b. learning guides: two column and other formats (p.103-20)
   c. free-response/thesis-proof or
      hypothesis-proof (pp. 125-129)
   d. problem-solution and four paragraph papers (pp. 121-124)
   e. frame paragraphs and essay examinations (pp. 133-135)
   f. RAFT assignments in content area (pp. 146-147)
   g. spool system paper - five paragraph paper format for
      writing in content areas (pp. 138-139)
   h. peer editing using five paragraph editing
      checklist (p. 141)

7. Vocabulary Development
   a. sentence sysnthesis (pp. 162-164)
   b. sentence expansion (pp. 164-166)

8. Directed Reading Activity (pp. 180-201)

CONTENT READING IN SECONDARY SCHOOLS
READING AND WRITING ACROSS THE CURRICULUM

3 DAY AGENDA

Day 1:

1. Theoretical foundation for learning across the curriculum
   a. background knowledge
   b. active vs. passive learning
   c. research in teaching comprehension
   d. direct instruction
   e. metacognition

2. Teachers as collaborative researchers and setting up classroom experiments

3. Text assessment: Considerate and inconsiderate texts
   a. overall structure of text
   b. chapter structure
   c. paragraph structure
   d. vocabulary development
   e. contextual analysis

4. Teaching text organization
   a. teacher modeling and think-alouds
   b. text assessment checklists for students

5. Student evaluation
   a. study skills inventory
   b. content informal inventory
   c. cloze assessment

6. Main ideas
   a. organization of main ideas (mystery pot)
   b. selective underlining
   c. note taking from memory
   d. summarizing - paragraph summary & one-sentence summary
   e. peer editing

Day 2:

7. Main ideas (cont.)
   f. conceptual mapping
   g. Question-answer relationships (Q.A.R!s)

8. Learning and writing strategies
   a. generating students' background knowledge before they read
   b. learning guides: Two column and various formats
   c. free-response/thesis-proof or hypothesis-proof
   d. round robin vs. read-recall
   e. problem-solution and four paragraph papers
   f. framed paragraphs and essay examinations

Day 3:

9. Learning and writing strategies (cont.)
   g. R.A.F.T assignments in content area
   h. spool system paper - five paragraph paper format for writing in content area
   i. peer editing using five paragraph editing checklist

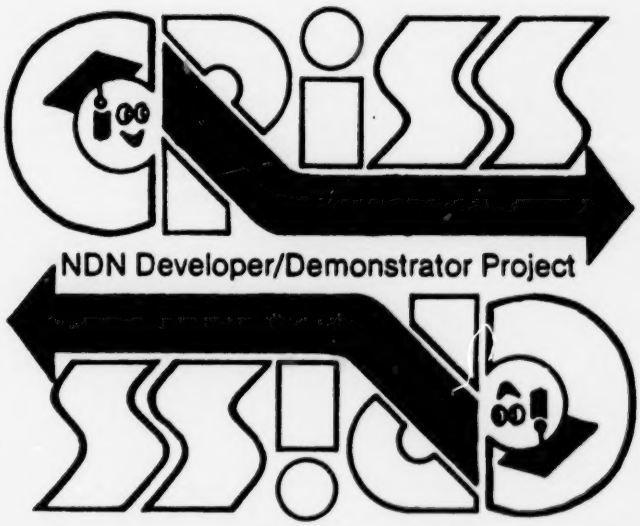
10. Vocabulary development
   a. sentence synthesis
   b. sentence expansion
   c. vocabulary expansion
   d. contextual analysis

11. Directed Reading Activity (D.R.A.)
   a. brainstorming in groups to plan a DRA unit
   b. group presentations of DRA within content areas

12. Spool paper summary

13. Evaluation & teacher agreement

Samples from the training manual
and student examples



Content Reading in Secondary Schools

SAMPLES FROM THE TEXTBOOK ASSESSMENT CHAPTER

Textbook assessment is critical to the effectiveness of a content reading program. One of the main goals of the CRISS project is to help students become more responsible for their own learning. If reading materials are beyond the comprehension of most students, the task of creating learner independence will be more difficult.

The CRISS project has developed Textbook Assessment Checklists for each of the four content areas: Language Arts, Science, Social Studies, and Mathematics. These checklists help a teacher or text adoption committee evaluate texts on the basis of content, organization within chapters and paragraphs, sentence structure, concept development, vocabulary density, and visual information.

A portion of one checklist is illustrated below:

Textbook Assessment Checklist

Social Studies

Name of text _____ Class _____

Author _____

Copyright _____ Grade _____

Publisher _____

I. Organization and Content

A. Overall Structure of book:

1.	Table of Contents	Yes	No
2.	Glossary	Yes	No
3.	Index	Yes	No
4.	Appendix	Yes	No

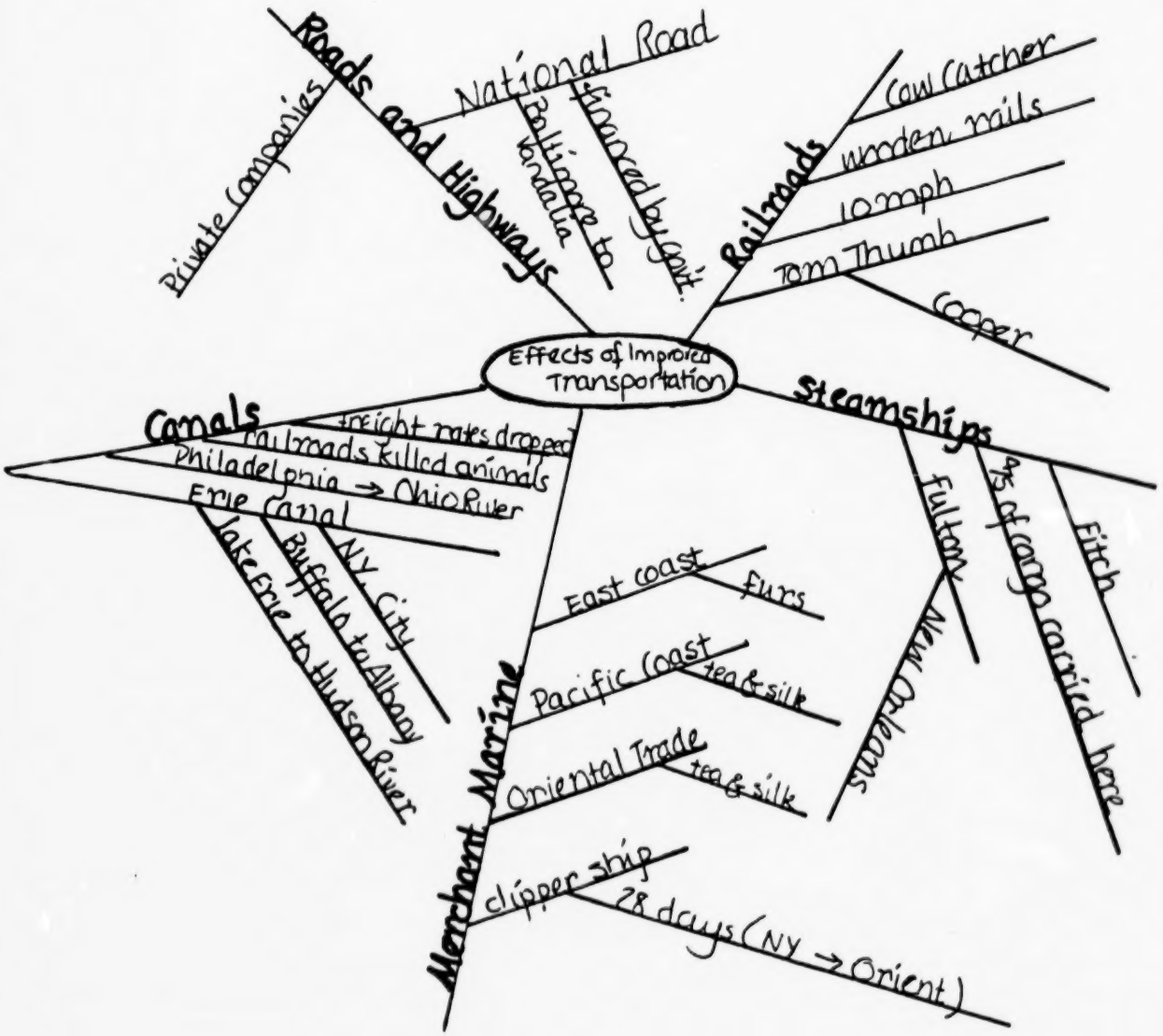
B. Overall Content:

		Yes	Sometimes	No
1.	Does the overall content of the text reflect what you feel are essential concepts in your course?	3	2	1
2.	Examine the scope and sequence of the content.	3	2	1
a.	Is the content presented topically?	3	2	1
b.	Or, is the content presented chronologically?	3	2	1
c.	Or, is there a combined topical and chronological arrangement?	3	2	1
d.	Based on the above considerations, is the scope and sequence appropriate to the material covered in the text?	3	2	1
3.	Examine (if applicable) sections of your text which focus on more recent issues? Is the content up-to-date?	3	2	1

SAMPLES FROM THE MAIN IDEA CHAPTER - Conceptual Mapping

One way to instill active comprehension and dynamic discussion is through group conceptual mapping. Students working, preferably in small groups, decide upon the most important ideas in their reading assignments and how these ideas relate to one another. Then they construct some type of visual scheme to represent their ideas.

A student example is illustrated below:



SAMPLES FROM THE LEARNING GUIDE CHAPTER - Two-Column Note taking

Learning guides have been one of the most successful components of the CRISS project. They are note taking procedures which are all designed to help students organize themselves for learning. Many formats from the general two-column form to material-specific forms are presented in the training manual. The two-column format as shown below has the paper divided lengthwise into two columns. In the left-hand column is a question or key word describing an essential concept or main idea. In the right-hand column information elaborating on the concept or main point is written. The guide may be used for studying by covering the right column and trying to answer the questions given in the left column.

A student sample is illustrated below:

THE PEARL: CHAPTER ONE Study Guide

1. Identify four characters introduced in the opening chapter of The Pearl.	1. Kino, Juana, Coyotito, the doctor.
2. What provides the rhyme for the Song of the Family in Kino's mind? What causes Kino to hear the Song of Evil?	2. The grinding stones worked by Juana create the rhythm for the Song of the Family. The appearance of the scorpion causes Kino to hear the Song of Evil.
3. Think of a few words to describe the living conditions of the Indians.	3. Primitive, poverty-stricken, simple, uncivilized, traditional, isolated, etc.
4. How does Kino injure his hand?	4. He smashes it against the gate of the doctor's house.
5. How does the mood of the story change in the first chapter?	5. In the beginning the mood is peaceful and calm. With the coming of dawn there are many pleasant sights, sounds, and smells. The characters seem content. When Coyotito is stung by the scorpion however, the mood of the story becomes threatening and fearful, as the Indians lose their feelings of security, a sense of evil replaces their sense of tranquility.
6. Do you think Coyotito had ever seen a scorpion before? Explain.	6. No, Coyotito laughed when he saw the scorpion and tried to reach out and touch it. He did not understand how dangerous it was.

SAMPLES OF WRITING STRATEGIES FROM MANUAL - Framed Paragraph

It is the philosophy of the CRISS project that learning can be enhanced by writing. In the Learning Strategies chapter of the training manual many writing ideas are presented which help the student progress from a well written, structured paragraph to a five paragraph paper. Procedures for making writing assignments within the content areas are also presented.

To use a framed paragraph the teacher must prepare a skeleton of a paragraph. Generally this includes a topic sentence and transitions where necessary to guide the students into giving support for a main idea and a conclusion.

An elementary example frame and student sample are illustrated below:

Weather in Montana is very different. First, ... Then, ... Next, ... Finally, ... It is hard to believe ...

Weather in Montana is very different. First, it doesn't even get cold until December. Then, there isn't any snow for Christmas. Next, it may be 40° one day and the next day it might be -20°. Finally, in March it is 60° until the last days when it snows. It is hard to believe weather can change so much in one place.

SAMPLES FROM THE VOCABULARY CHAPTER - Sentence Expansion

Each content area has its own vocabulary. If students are to learn independently in any area, they must learn its basic vocabulary. It is important in every subject area to provide some vocabulary instruction.

Sentence expansion is a procedure for helping students expand and reinforce new vocabulary. A teacher writes a simple sentence on the board and then students brainstorm answers to the questions: what?, when?, where?, how?, and why? Finally an expanded sentence(s) is written.

A sample from a high school biology class is illustrated below:

Original sentence: Plants photosynthesize.

Brainstormed ideas:	What kind?	green, trees, flowering plants, grass
	When?	daytime, summer, when sun is out, some parts don't require sun, in artificial light
	Where?	chloroplasts, leaves, chlorophyll
	What is necessary?	sun light, water, carbon dioxide, temperature
	What is formed?	glucose, oxygen
	Why?	to change light energy to chemical energy

Student example:

Trees and flowering plants photosynthesize in the daytime. The chlorophyll in the chloroplasts located in the leaves combines with light, water and carbon dioxide to form glucose and oxygen. The end result is that light energy is changed into chemical energy.

EVIDENCE OF EFFECTIVENESS

Evaluation Design

The primary evaluation of Project CRISS involved two pre/post comparison group designs. Study I utilized eight intact classes of high school (juniors) social studies students in the Kalispell School District taught by four social studies teachers (two courses each). Experimental condition was randomly assigned to teachers. In this way classes were randomly assigned to experimental condition in pairs. Study II employed two developmental site intact classes of sophomore science students. These classes were randomly assigned to treatment and comparison conditions.

Evidence of the generalizability of the project was gained through a pre/post treatment group design using senior social studies subjects from an adoption site. All project evaluations were designed to mirror, as closely as possible, actual classroom learning and testing situations.

Instrumentation

Content retention involves two distinct constucts -- RECALL and RECOGNITION. A valid assessment of project CRISS required the measurement of both dimensions.

The RECALL dimension assessment involved the selection of several pages of relevant information at a reading level appropriate to the sample. The selected prose was then dissected into "idea units" or underlying propositions to form a "grid" and provide a consistent basis for scoring. Assessment by this method was conducted in the following way. Students first studied the prose for 40 minutes, after which, the text and all notes were removed. After a period of delay (24 hours), participants were then asked to recall as much information from the article as they could. Scoring was based on the number of idea units an individual was able to recall.

PRETEST				POSTTEST		
STUDY (40 mins)	DELAY (24 hrs)	RECALL (40 mins)	INTERVENTION (3 months)	STUDY (40 mins)	DELAY (24 hrs)	RECALL (40 mins)

This strategy is considered to be highly sensitive to the effects of CRISS because students are given no external memory cues to aid recall and therefore must rely on the organizations and structures that they themselves have imposed on the prose material. In addition, the 24 hour delay between reading and recall makes the free recall format a sensitive measure of longer term or lasting retention. Research has shown that "forgetting" follows an exponential curve with the large majority of information being "lost" in the first 24 hours.

Two different free recall formats were used in this evaluation. Studies I and III employed a 3 1/2 page single spaced social studies article about life in the 1920's while Study II employed a science article of similar length on the physiological mechanisms of thirst. Although the content of these texts was relevant to the students' course of study, care was taken to avoid the inclusion of material that might be encountered by the students during the treatment period. In this way, the presented results solely reflect changes in recall ability and are not contaminated by such variables as study time. These free recall instruments obviously possess high content and face validity. Interrater reliability coefficients calculated on two independent scorers across 30 tests for the described instruments ranged from .91 to .94.

In RECOGNITION, the student is able to select the appropriate fact from a list of facts. In this way, he "recognises" what he has previously learned. Relying on the recognition indices of memory, this dimension of content retention is a much lower level skill than recall because such memory cues as multiple-choice distractors are necessary to aid the recall of information.

Project effects on the recognition dimension were assessed in two ways. In Study I, subjects were measured on the American History subscale of the Comprehensive Assessment Program (CAP). This standardized content test was selected on the basis of its content validity. The publishers estimate the reliability (KR-20) of the subscale at 0.87. This instrument is widely used to assess social studies programs, usually on a post-only basis. A second instrument was used to assess recognition in Study II. Here, a multiple-choice format test was constructed around the "Thirst" reading selection described above. Test items were developed by two science teachers and examined for content validity by five other professionals. The test was then revised until all teachers agreed that its 25 items addressed the key points of the article. Test retest reliability was estimated at 0.83. Like the Recall format, this test was also administered with a 24-hour delay.

Data Collection and Scoring

All data were collected by the classroom teachers. However, several precautions were taken in order to ensure reliability. Identical test directions for all assessments were read by the teachers to each group, the time allocations for the reading and recall/testing portions of the tests were standardized, and in order to eliminate the possibility of scorer bias, all tests were scored blind (unaware of experimental condition) by a well trained and practiced scorer.

Evidence of Project Impact

Study I was designed to assess the impact of Project CRISS on two distinct groups of students. The study employed eight junior level social studies classes from Flathead High School in the Kalispell Public Schools. Four of these classes were "college bound" and four were vocational or "non-college bound". The eight classes were taught by four teachers (two classes each). Teachers, rather than classes were randomly assigned to treatment and comparison conditions. In this way, classes were randomly assigned to experimental condition in pairs. Treatment teachers received the CRISS training prior to the beginning of the study. No CRISS training was given to comparison teachers.

Both the Free Recall Test I and the CAP (American History subscale) were administered according to the described procedures during the first week of September 1983. Students were post-tested on recall during the first week of December of the same year, while CAP post-testing was conducted in May 1984. Direct CRISS instruction was given only in the first semester. During this time, comparison students received their regular social science instruction while treatment students received the same tutorage plus CRISS instruction. All CRISS activities took place within the time allocated for social science and consumed an average of 5 minute per class.

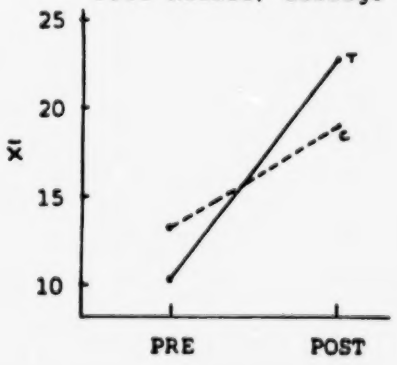
Results

A. College Bound Students. Pre and Post test means, standard deviations and mean gains for treatment and comparison groups (free recall data) are presented in Table 1.

Table 1: Pre and Post Means, Standard Deviations and Mean Gains for College-Bound Students (Free Recall Data)

		PRE		POST		
Group	n	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$ gain
Treat.	47	10.43	4.74	22.85	8.79	+ 12.42
Comp.	50	13.28	5.44	19.56	5.20	+ 6.28

Figure 1
Free Recall/ College



While significant differences ($t=2.59; p<.05$) in favor of the comparison group existed at pre-test, CRISS students significantly outperformed their comparison counterparts following the treatment period ($t=2.03; p<.05$). In a two way ANOVA with repeated measures, this classic interaction effect (groups X tests) was significant at the .001 level ($F=23.04$). This effect is graphically presented in Figure 1.

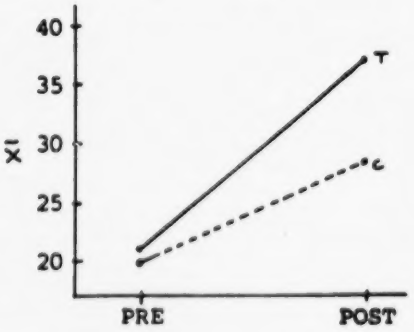
During the course of the treatment period, CRISS students improved their free recall test performance by approximately two standard deviations. As in any two-trial learning situation (testing effect) of this kind, gains were also expected of and made by comparison students. These gains were, however, approximately half of, and a full standard deviation less than, those made by CRISS students.

Pre and post CAP data for the same study are presented in Table 2. While no significant differences between the two groups existed prior to the treatment period (t=0.73), the treatment group significantly outperformed its comparison counterpart following the CRISS intervention. This effect was consistent across classrooms. No differences by sex were observed (t=0.56). In more interpretable terms using publisher's norms, while the two groups were highly similar prior to the intervention, the 91st median percentile post-test ranking recorded by CRISS students far exceeded that of the regular curriculum group (67th percentile).

Table 2: Pre and Post Means, Standard Deviations and Mean Gains for College-Bound Students (CAP Data)

		PRE		POST		
Group	n	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$ gain
Treat.	44	20.50	4.32	36.81	5.55	+ 16.31
Comp.	42	19.73	5.39	28.45	6.46	+ 8.73

Figure 2
CAP/College

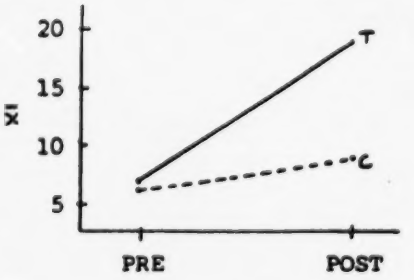


B. Non-college Bound Students. Pre and post free recall data for non-college students are presented in Table 3. An interpretation of this information leads one to conlude that non-college CRISS students significantly outgained their equivalent comparison group during the treatment period. While no differences between the two groups were evident at pre-test (t=1.28;p=ns), large differences in favor of the project students were observed following CRISS treatment (t=7.27;p<.001). Gains made by the comparison group ($\bar{x}$ gain=3.33) were approximately one third of those recorded by CRISS students ($\bar{x}$ gain=10.91) who improved their pre-test performance by over two standard deviations. This differential performance by the two groups is graphically represented in Figure 3.

Table 3: Pre and Post Means, Standard Deviations and Mean Gains for Non-college Students (Free Recall Data)

		PRE		POST		
Group	n	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$ gain
Treat.	44	7.32	3.92	18.23	6.86	+ 10.91
Comp.	42	6.10	4.48	9.43	3.97	+ 3.33

Figure 3
Free Recall/Non College

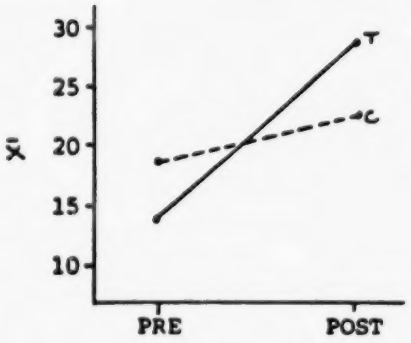


When CAP data for the same groups were examined (Table 4), it was found that while the comparison group performed significantly better ($t = -2.74; p < .01$) than the CRISS group prior to treatment, the effect was reversed following the intervention ($t = 4.01; p < .001$). CRISS students outgained their comparison counterparts by over one standard deviation and post-tested at the 71st median percentile as compared to the 46th percentile performance of the non-treatment group. Once again, the reliability of the effect was evident in the absence of class differences. Sex was not a factor.

Table 4: Pre and Post Means, Standard Deviations and Mean Gains for Non-college Students (Multiple Choice Data)

		PRE		POST		
Group	n	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$ gain
Treat.	40	14.57	4.51	28.55	6.23	+ 13.98
Comp.	38	17.47	4.75	22.87	6.26	+ 5.40

Figure 4
CAP/ Non College



Study II, conducted in Kalispell Public Schools provides evidence of the project's effectiveness in the area of science. Conducted in the fall of 1983, this study employed two non-college bound sophomore science classes taught by two science teachers and spanned a full semester. One of the cooperating teachers received CRISS training prior to the beginning of the study and began implementing the curriculum with his students immediately following the pre-test administration of the recall and recognition tests. CRISS intervention precisely followed the procedures previously described in this document. The comparison classroom teacher was not trained in CRISS and no CRISS instruction was given to the comparison group. The results of this study are presented in Table 5.

An examination of free recall data reveals that while no significant differences ($t = .19; p = ns$) between the two groups existed prior to treatment, CRISS students significantly outperformed their equivalent comparison group at post test ($t = 3.47; p < .01$). When these data are examined in a Two-Way ANOVA with repeated measures a significant interaction effect ($F = 11.04; p < .002$) is found (Figure 5). A similar interaction (groups X tests) is noted when multiple choice data are processed in the same manner ($F = 7.823; p < .008$).

Table 5: Pre and Post Means, Standard Deviations and Mean Gains for Treatment and Comparison Non-college Bound Science Classes (Free Recall and Multiple Choice Data).

			PRE		POST		
Test	Group	n	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$ gain
Free Recall	Treat.	19	6.11	2.31	16.16	6.81	+ 10.05
	Comp.	19	5.98	1.78	10.42	3.78	+ 4.47
Mul. Choice	Treat.	19	12.05	3.96	15.47	4.85	+ 3.42
	Comp.	19	13.26	2.98	13.21	3.68	- 0.04

Figure 5
Free Recall Data

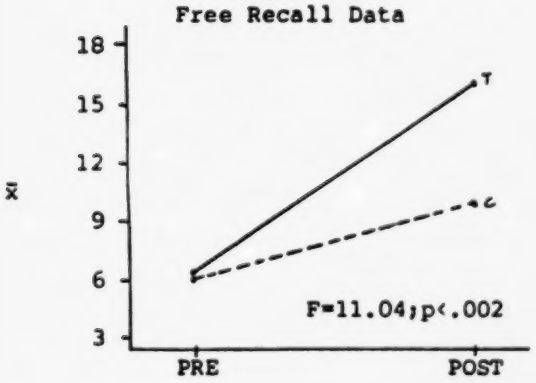
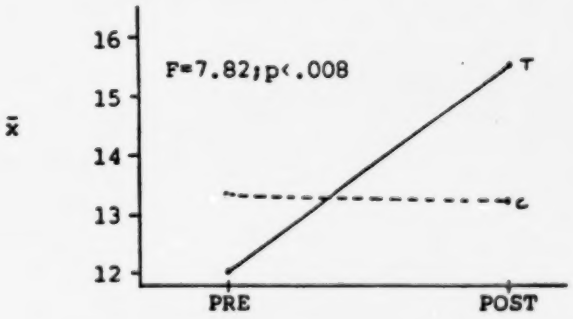


Figure 6
Multiple Choice Data



In summary, the data presented provide strong testimony to the impact of Project CRISS on both college and non-college populations. In both recall and recognition test formats, significant effects ($p<.005$) in favor of treatment students were noted. The data were both consistent and descriptive of trends one might intuitively expect, thus lending credibility to the evidence presented. It is also important to note that CRISS social studies teachers reported better classroom performance on the part of their students than did comparison teachers. In addition, semester grades in history were considerably higher in the treatment classes with 30% more "A" and "B" grades. The described improvement in student learning can be directly attributed to a change in instruction. Teachers implementing CRISS strategies teach students how to learn from their reading along with content instruction. As a consequence, students are able to directly apply learning stategies to their regular course assignments and learn more course information.

Evidence of the Generalizability of the Effect

Study III was conducted at a CRISS adoption site similar in nature to the Kalispell School District and employed two classes of college bound senior social studies students. The two teachers of these classes received standard CRISS training one week prior to the beginning of the investigation. Pre-tests were administered in March and post tests two months later in May of 1983. Experimental and treatment

procedures were identical to those previously described. The data gained from this study are presented in Table 6.

Table 6: Pre and Post Means, Standard Deviations and Mean Gains for Two Adoption Site Social Studies Classes (Free Recall Data)

		PRE		POST		
Group	n	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$ gain
Class 1	27	22.00	9.57	41.70	13.85	19.70
Class 2	25	18.68	9.96	40.04	17.15	21.36
TOTAL	52	20.40	9.81	40.90	15.33	20.50

As can be seen, both classes of adoption site students exhibited gains of approximately two standard deviations from the pre-test mean scores. This growth is of the same order as that attributed to developmental site students.

In summary, these data provide evidence of the generalizability of the effect observed at the developmental site. The gains of two classes of adoption site students were of a similar magnitude to those reported in Study I.

Educational Significance

Project CRISS deals with the subject matter of the greatest importance. Learning how to learn from reading is a fundamental skill vital to the success of students in all areas of endeavor.

The magnitude of the change caused by this program is clearly evident. Project student gains consistently exceeded two full standard deviations when assessed by recall tests. Even with the less sensitive recognition format, student gains approximated one standard deviation. In real terms, after removing the effects of testing and maturation (estimated by comparison group data) college bound CRISS students increased by 60% and non-college students doubled the information they were able to retain. This effect is substantial, to say the least. This level of increased retention, extrapolated across all the subject matter encountered by a student during the course of his or her high school tutorage, would result in phenomenal impact!

Replicability/Generalizability

The evidence presented and the experience of CRISS staff indicate that the program is readily implemented in other school districts. The program is inexpensive and has no recurring costs. No special facilities or teaching staff are required. CRISS staff are experienced trainers who have made numerous presentations at national and regional conferences and in local schools. During its two years as a state demonstration site, Project CRISS has trained 488 teachers from 53 school districts. In addition the project has received widespread attention through its presentations at national and regional conferences and through staff authored publications in book chapters and professional journals. CRISS staff have hosted many visitors at the project site and have authored the necessary materials for dissemination.

CRISS Project

School District No.5 233 First Avenue East Kalispell, Montana 59901

The following article appeared in the September, 1986 issue of the Maine Facilitator Center Newsletter.

High School Study Skills

CRISS trainer Lynn Havens (l) confers with Jan Grant, a Scarborough High School teacher who will become an instate trainer for this popular program.

Every once in a while, we offer a new program to Maine school districts that takes us by surprise. Last year, when we introduced *Content Reading in Secondary Schools (CRISS)* to Maine high school teachers, we didn't expect such unabashed enthusiasm for this high school study skills program. Maine teachers unanimously praised the program as being immediately useful and relevant to any content area subject.

What seems particularly appealing is *CRISS*'s approach to study skills. Rather than add on to an already overfull curriculum, *CRISS* advocates changes in instructional style, not a change in materials. The program offers new strategies for teaching specific subject matter. And what makes *CRISS* particularly appealing to veteran teachers, is that it offers a variety of techniques from which to choose. There's no rigidity or structure that dictates a specific sequence or strategy. Rather, the teacher chooses from an array of ideas - modifying, adapting, adding or eliminating steps that don't seem suitable for a particular teaching style or group of students.

Validated for grades 10-12, *CRISS* offers creative reading, writing, organizational, and studying strategies for students in grades 4-12, in any content area. Two *CRISS* training workshops have been scheduled in Maine this fall, one each in Scarboro and Augusta.

Call our office for additional information about *CRISS* or the forthcoming training workshops.

For additional information about the CRISS Project write to the above address or call Lynn Havens or Carol Santa, (406) 755-5015.

The following comments are from Bradford County School District teachers in Starke, Florida. Their training was in August, 1986

My response to our two-day workshop and additional comments are: Learned a lot of new teaching techniques. Workshop was well organized & very well presented - Think CRISS is a great program —

The workshop presenters were energetic and well informed and highly motivating.

It was very exciting & informative & I feel very positively about the value of the strategies for the students.

The workshop was very informative. & learned a great deal and also had an enjoyable time

Excellent - one of the few inservice workshops I have enjoyed & feel what I learned will be very useful.